

## **Domestic Investment as a Drive of Economic Growth in Libya**

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### **Abstract:**

This study aimed to identify the impact of domestic investment as a determinant of growth in the Libyan economy during the period (1962-2008). Cobb-Douglas Function was used to analyze the relationship between real per-capita GDP and its most important determinants as described in Cobb-Douglas function. Properties of time series of the model variables have been analyzed by using several tests for determining the integration level of each time series separately.

By using Johansen approach, the results showed the significance of the impact of investment on per-capita GDP, the results of tests revealed equilibrium relationship between per-capita GDP and its determinants in the long and short-run. The study concluded that the elasticity of per-capita GDP to changes in domestic

investment is greater than the elasticity of labour force which appeared inelastic in the short and long-term.

## 1. Introduction:

Economists have been interested in economic growth for several decades. This subject assumes an important place in economic theory. Economic growth has become particularly relevant to researchers since the 1990s with the emergence of the modern growth theory.

Growth theory analyses the disparity in the rates of economic growth between countries, in order to identify the factors that affect the growth of output. These factors differ in terms of their impact on growth depending on economic circumstances. Determinants of growth are not identical in all countries, differing from one country to another, and from one time period to another. The type of economic system also affects the ratio of the impact of these determinants.

Economic growth in the MENA countries was weak during the 1980s and 1990s compared with the rate of growth in other regions. During the period 1980-2005, economic growth in the MENA scored 0.5%, while it was 4%, 0.6%, respectively in the East Asia and the rest of the developing countries (Albrikan et al, 2006). However, the growth rate in Libya was approximately 0.76% during the same period<sup>1</sup>.

The absence of growth was a source of concern to policy makers in MENA, as it is exacerbating the problems caused by the generally high unemployment rates and relatively fast growth in the size of the labour force in the region. Given the policy of openness witnessed recently, Libya was focused on the policy of encouraging foreign direct investment with lessening in domestic investment, which may neglect an important factor of development that can be harnessed to support economic growth and increase its rates.

Therefore, defining the direction and impact of domestic investment on economic growth helps to develop economic policies for benefiting from this source and makes it a leading element in the process of growth and development in the national economy.

In addition to correcting imbalances that may occur in the direction of domestic investment and return it in the right trend. This study relied on a descriptive analytical approach to analyze and describe some important determinants of growth in the Libyan economy (see table 4), and to analyze the important aspects related to economic growth and the factors affecting these variables. In addition, the study adopted the applied traditional methodology in econometrics for the purpose of testing the extent of significant determinants of growth and its impact. That was achieved by using time series analysis to determine the stability of the degree of those parameters and the nature and direction of the causal relationship between independent and dependent variables during the period (1962–2008).

The results indicate that there is a positive relationship between investment and economic growth in the Libyan economy, and a low efficiency of investment in supporting Libyan economic growth. That is due to the low levels of production and productivity, in addition to the suspension of many industrial and agricultural projects, as well as public services, leading to a waste of resources.

## **2. Recent Studies:**

The study by Barro (1991) on the determinants of growth in many economies (about 100 countries), pointed out that there are many variables that affect the rate of growth in the long term included the ratio of investment.

Martu (1997) in his study identified many variables that affect the rate of economic growth, including factors related to the growth of

investment, as well as the degree of economic openness and level of education.

The applied study by Amanja & Morrissey (2006) examines the determinants of growth in Kenya during the period (1964-2002). Growth in this study was reflected by per capita GDP as a dependent variable, and independent variables are: investment; foreign aid; and economic openness level. The study found that investment had a strong impact on growth in Kenya, in addition to the impact of openness level.

The Study by Mallick (2002) examined the effects of long-term growth in India during the period (1950-1995), the authors relied on the use of neo-classical model with endogenous growth. Economic growth is measured in terms of real GDP. The findings of this study indicated that the real public investment expenditure affects growth in a direct manner, and private investment has an indirect effect.

The study by Alabdeli (2005) analyzed the impact of some economic variables (exports, investment) on economic growth in 21 developing countries. This study used time-series during the period (1960-2001), and concluded that domestic investment has a positive significant relationship with economic growth.

Study by Frankel (1997) examined the impact of some economic factors, including investment in public and private sector on economic growth in East Asian economies. This study found that investment is one of the most powerful determinants of economic growth in the long term.

Through the study of the most important theories and some applied studies of economic growth, we found that the determinants of economic growth differ from one country to another and from one time period to another. These showed that the most important determining factor affecting economic growth is investment, which has a positive effect on economic growth in countries.

Through what has been discussed above, investment is an important factor affecting economic growth, hence, domestic investment is expected to be an influential factor on economic growth in the Libyan economy. Libyan government's interest in foreign direct investment in recent time may mean domestic investment is ignored if the government does not take steps to support domestic investment. Therefore, paying attention to the impact and directions of domestic investment is an important aspect of supporting the domestic economy and increasing its growth rates.

### **3. Domestic Fixed Capital Formation in the Libyan Economy:**

The economic problem facing the majority of developing countries - in the opinion of many economists - is the problem of low volume of investments. Therefore, the success of these countries to achieve economic growth depends on their ability to increase investment rates. The problem of low savings rates in developing countries is highlighted as a key obstacle to increased investment rates, which calls for these countries to rely on developed countries to obtain the loans necessary to achieve growing and continuing economic development.

If borrowing from developed countries is a procedure required by the pace of development in its early stages, developing countries should rely on themselves to mobilize national savings to provide the resources necessary for the required investments. Developing countries should encourage private initiatives and accelerate privatization, and assist the private sector in advance of development, and rationalize public investment in order to mobilize all the capabilities of national development because of the problems and difficulties for international financing for development. No doubt this

requires the adoption of appropriate policies to reach the desired level of private investment and privatization, and public investment.

Increase of investment spending in the first years of the 1990s reflected positively on the rate of growth, some of the policies applied by the government helped to do so, where the non-oil sector achieved a positive growth at the beginning of 1988. That high investment spending was accompanied by a high savings surplus in most years of this study<sup>2</sup>. Hence, during the second half of the 1980s the Libyan economy was exposed to external sanctions which resulted in a decrease in the quantity of oil exports. This was coupled with low oil prices in global markets, resulting in lower oil revenues. Following, the investment rate falling significantly, this negatively impacted on the rate of growth of non-oil output sectors, where the rate of growth had negative values in the years 1985, 1987.

The continuous decline in the values of the oil output sector, and change in surplus savings to the deficit in the final years of the 1980s led to a decline in the rate of investment during the early 1990s. This made the Government focus on reducing investment spending in the infrastructure and manufacturing sectors.

In recent years of 1990s, and early 2000s oil prices rose in the world markets, following that, the value of investment expenditure increased during the period (2000-2006), which led to a rise in the rate of growth in non-oil sectors.

Production structure suited to the structure of investments in some sectors, increase investment in some sectors resulted in a rise in its contribution to non-oil GDP (General Planning Council).

Dominance of the public sector on most of the industrial sector activities during the 1980s was limited to generate a high growth rate of the investments of the latter sector. However, the privatization of loss-making companies in the industrial sector, and allowing the private sector to engage in industrial activities led to an increase in the contribution of the industrial sector in the composition of output. The

increase of contribution of this sector may be partly due to the participation of the private sector in economic activity. Contribution of the agricultural sector in the composition of the non-oil GDP increased steadily over the period 1978-1999, meaning that this sector has not been affected by lower investment. After 2000, this contribution began to decline slowly. It follows that there are factors other than capital formation which have an impact on the output of the agricultural sector.

Regarding the distribution of investments between the public and private sectors, it is clear that the public sector absorbed most investments over the period 1978-2007 (see table 5). As is the case in many Arab countries, the dominance of the public sector on economic activity comes under the framework of the socialist transformation. In Libya, the public sector accounted for 78.5% of investments during the 1970s, and then rose to 91.4% during the 1980s. This percentage declined during the 1990s to reach 81.7% in 1999, then 77% in 2005, and 82% in 2007, which was coupled with an increase of the value of private sector investments (Central Bank of Libya's Reports). However, the ongoing reforms and changes in economic policy have resulted in a state of uncertainty which has led to a slow growth of private sector investments; most of these investments are concentrated mainly in the services sector. The inability of investors to predict the future makes them prefer to await the results of reforms before making a decision to invest. Uncertainty is reflected in the high rate of contribution of the services sector (with rapid returns) to GDP at the expense of the commodity production sectors.

Libya has made many efforts on all fronts, economic, social, and political to encourage investment. This study will assess whether the policy pursued by Libya in the field of domestic investment has had a positive effect on growth. It will also try to determine the role of domestic investment, both private and public, in influencing economic growth in Libya.

## **4. Analysis of the Model:**

### **4.1. The Model:**

An econometrics model is applied to test the basic hypotheses of the study. With respect to the model of study, the economic theory assumes through the growth theories that economic growth depends on some determinants. To determine the existence or non-existence of the relationship between the used variables, and to determine whether this relationship linear or non-linear, this study adopted the ordinary least squares method (OLS).

This method is used to estimate economic relations, because it gives the best linear unbiased estimator, based on the theoretical framework of this method, which estimates the economic growth equation on the independent variables mentioned above. This study relied on a descriptive analytical approach to analyze and describe an important determinant of growth in the Libyan economy, and to analyze the important aspects related to economic growth and the factors affecting these variables. In addition, the study adopted the applied traditional methodology in econometrics for the purpose of testing the extent of significant determinant of growth and its impact by using time series analysis to determine the stability of the degree of this parameter and the nature and direction of the causal relationship between independent and dependent variables.

A number of theories such as Harrod-Domar and Neoclassical theory, referred to investment rate as a determinant for economic growth. This study adopted the classical theory model of growth represented in the Cobb-Douglas model (Nerlove, 1965) by introducing the domestic investment factor in the equation instead of capital stock to investigate the effect of domestic investment on economic growth in Libya and compare it with the impact of another important factor which is the labour force. Classical theory recognized that the sources of growth include capital, labour and technology, and



the proportion of each variable can be identified through the production function (Cobb-Douglas) as in the following equation:

$$Y = AK^\alpha L^{1-\alpha} \quad 4$$

Where:

$\alpha$  is the share capital of the value of production, and  $(1 - \alpha)$  is the share labour of the value of production

This equation can be in the following format:

$$\frac{\Delta Y}{Y} = \frac{\Delta A}{A} + \alpha \cdot \frac{\Delta K}{K} + (1 - \alpha) \frac{\Delta L}{L} \quad 5$$

In other words, the rate of growth in GDP can be determined by the rate of growth in A, K and L. Because the change in capital stock is equal to investment, i.e.  $\Delta K = I$  the form of the equation can also be written as follows:

$$\frac{\Delta Y}{Y} = \frac{\Delta A}{A} + \alpha \cdot \frac{I}{Y} + (1 - \alpha) \frac{\Delta L}{L} \quad 6$$

Given that  $\frac{\Delta A}{A}$  reflects the residual part of the basic equation, the regression equation is as follows:

$$GDP \text{ growth} = \beta_1 \frac{I}{Y} + \beta_2 \Delta L + e \quad 7$$

Where:

share labour of the value of production, and  $e$  = error term.

Real per capita GDP can be used instead of GDP growth, and by taking the logarithms of equation (7), and because this study focused on the impact of domestic investment on economic growth, then we get:

$$\ln Y = \alpha + \beta_1 \ln I + \beta_2 \ln L + e \quad 8$$

Where:

$\alpha$  = constant coefficient

Y = real per-capita GDP

I = real domestic investment

L = labour force

e = error correction.

In this study, the time series during the period 1962-2008 was used to determine the impact of investment on growth in the Libyan economy. Per-capita GDP, investment and labour force are calculated from data in constant prices (1997=100) and national currency unite<sup>3</sup>.

There is a positive relationship between real GDP. This is according to the studies of Frankel, 1997 and Omar, 2002. In terms of explanatory variables and their relationship with a dependent variable, there is consensus among economists on the existence of a direct correlation between investment and the growth of real GDP. Neo-Keynesian and Neo-classic investment theory suggest investment is positively related to the growth of real GDP. This relationship can be derived from the model of flexible acceleration (Sikwila, 1992), which assumes a production function with a fixed relationship between the desired capital and changes in GDP. According to what has been raised above, investment expected to have a positive relationship with the rate of growth in GDP.

A series of applied studies have proven that employment has a positive effect on investment and its growth (Al-Gannam, 2004; Amin, 2002; Wang & Yao, 2001). Other studies have looked at other aspects of employment, such as the number of hours worked and salary costs. This study will use data concerning the number of workers, following the work of Knatiwada & Sharma (2002).

#### 4.2. Testing for Stationarity:

This study analyzed the relationship between real per-capita GDP and domestic investment during the period (1962-2008). It

adopted a time series analysis and the detection of its stationarity by using the Augmented Dicky-Fuller (ADF).

For the importance of identifying the gap used in the unit root tests, we used standard in ADF test. In the case of non-stationary of the model variables, we determine the degree of integration. If the time series are non-stationary at the same level, thus, it is difficult to achieve long-term relationship between the variables of the study. The ADF test indicates that none of the variables are stationary in their level, but are stationary in the first differences (table 1). This means that the variables are integrated of order 1 or I (1). Therefore, it is possible to move on the next step, attempting to detect if any of these variables co integrate.

After making sure the time series of the model's variables in this study are not stationary in the level but stationary in the first difference, and then making sure all of them co-integrated, it is expected that there is a long-term relationship between real per-capita GDP (*lnY*) and the explanatory variables (domestic investment (*lnI*) and labour force (*ln L*)).

#### 4.3. Testing for Cointegration

Engle-Granger test is enough if the number of variables in the model is only two, but if they are more than two, it is preferable to use Johansson cointegration test. Johansen, 1988; Johansen and Juselius, 1990 are used to confirm the relationship in the long run equilibrium between economic growth and its determinants in this study (investment and labour). Table (2) showed the Trace and Maximum Eigenvalue tests results in order to determine existence a relationship between the variables in the long run or not.

Cointegration test described in Table (2) showed that we cannot accept the null hypothesis ( $r = 0$ ), which states that there is no cointegration equation at statistics level of 5%, but we also cannot reject the null hypothesis ( $r \leq 1$ ) at statistics level of 5%. Accordingly,

there is only one cointegration equation between investment and labour from a side and growth from another.

The cointegration equation by using the Johansson test is as seen in table 3.

It is clear from the statistics in the last equation statistical validity of the model in general. The statistics (Durbin h test) is significant at 1%, the model is free from serial correlation in the case of inclusion the dependent variable lagged for a single period as an explanatory variable. To ensure the absence of econometric problems in error correction model, several tests has been used, they found that the model has exceeded all residuals statistics test, such as condition for normality distribution by using the (Jarque-Bera), and free from the serial correlation using a test (LM) until the third degree. In addition, there is no variance until the third degree by using (ARCH test) as well as by using (White test). Moreover, there is no restriction error in the model by using (Ramsey RESET Test).

#### **4.4. Empirical Results:**

In the light of the results to the error correction model in table (3), it be noted that correction error variable is significant ( $\epsilon_{t-1}$ ) at 1% level, with the expected negative indication. This also confirmed the long-run equilibrium relationship in the model. Value of the error correction coefficient (-0.39) indicates to per-capita GDP adjusts toward its equilibrium value in each time period by 39%. In other words, pre-capita GDP corrects the imbalance of its equilibrium value which remainder of each past period about 38%. That is, when per-capita GDP during the short-run in the period (t-1) diverts from its equilibrium value in the long run, it is corrected about 38.6% of this deviation in the period (t). In other words, this percentage of correction reflects a low adjusting speed towards equilibrium, in the sense that per-capita GDP takes approximately 2.6 years ( $1/0.39$ ) towards the equilibrium value after impact of any shock in the model as a result of a change in its determinants (investment, labour). The

explanatory power of the equation  $AdjR^2 : (0.44)$  implies that 44% of the variation in per-capita GDP is explained by these explanatory variables, and the remainder (56%) due to other variables.

By using the results of estimating model in table (3) we got the elasticity of per-capita GDP to its determinants in the long and short-run. The equation indicates that the estimated parameters have the expected signs, which means per-capita GDP is directly affected by investment and labour. Per-capita GDP is more flexible to investment than labour in the short and long-run. From the results we note that the increase in investment by 1 unit lead to a direct increase in per-capita GDP by 0.44%, and continues its impact in the long run until it reaches 0.73%. This may be indicative of the adoption of per-capita GDP partly on the size of the domestic investment. As for the impact of labour, the study found that the increase in size of labour by 1 unit leads to an increase of per-capita GDP by 0.17% in the short-run and 0.40% in the long-run. An increase in the rate of employment in the Libyan economy has little impact on economic growth in general. Accumulation of the number of labours in some production locations over the required led to a decline in productivity. This is according to the law of diminishing returns, which states that as equal quantities of one variable factor are increased, while other factor inputs remain constant, a point is reached beyond which the addition of one more unit of the variable factor will result in a diminishing rate of return and the marginal physical product will fall (Gorman, 2003).

The results of long-term relationship obtained by Johansen approach are come compatible with the economic theory for the both variables (investment and labour), the results were significant as well except for labour in the short run, in addition, the results indicate that investment affects the growth (reflected in per-capita GDP) more than labour, this indicates that investment is somewhat driving growth in Libya. Results also indicated that the cointegration vector coefficients,

which describes the long-run relationship are significant, that because the value of likelihood = 275.47.

#### **4.5. Causality Test:**

This paper uses the Granger causality test which takes into consideration the time series properties of the data to examine the incidence of investment drive growth in Libya. The applied of Granger causality test confirms the relationship between investment and real per-capita GDP in the Libyan case as resulted by Barro, 1991, and Amanja 7 Morrissey, 2006.

Results showed that changes in investment helps in explaining the changes in per-capita GDP, or domestic investment causes economic growth, according Granger's concept, the calculated value of F (5.30) is statistically significant at a level (1%), while the changes in per-capita GDP does not lead to changes in investment as the value of F statistics (2.51) is less than the critical value of F. Accordingly, there is a causal relationship with one direction from investment to per-capita GDP in the Libyan economy. In addition, there is a single direction between labour and per capita GDP which declared that per capita GDP is causing labour, where statistics value of F equalled to 5.52.

#### **5. Conclusions:**

The study aimed to analyze the relationship between investment and economic growth expressed in real per capita GDP in Libya in the long run and test if there is a short-run relationship.

•Time series analysis showed that the variables are stationary at its first level of statistics level 5%, and stationarity test for residuals indicated the variables of the study are free of unit root at the statistics level of 1%, and they are integrated of the level I(0). In addition, Maximum Eigenvalue and Trace Tests indicated to the existence of

one equation for cointegration, thus, the cointegration tests indicated to existence a long-run equilibrium relationship between investment and economic growth.

•Causality test indicated to the existence of a causal relationship in the long and short terms of investment and growth, changes in investment helps to explain the changes in economic growth, that can be justified in investing part of oil revenue in some of the projects lead to an increase in the average per capita GDP which enhances the opportunities for economic growth. There is also a single direction between labour and per capita GDP which declared that per capita GDP is causing labour, where statistics value of F equalled to 5.52. This due to the increase in growth rates lead to a revitalization of the economy, increase employment opportunities and attract labour in the Libyan economy.

•Per-capita GDP is more flexible to investment than labour in the short and long-run. This may be indicative of the adoption of per-capita GDP partly on the size of the domestic investment. As for the impact of labour, the study found that an increase in the rate of employment in the Libyan economy has little impact on economic growth in general. Accumulation of the number of labours in some production locations over the required led to a decline in productivity. This is according to the law of diminishing returns, which states that as equal quantities of one variable factor are increased, while other factor inputs remain constant, a point is reached beyond which the addition of one more unit of the variable factor will result in a diminishing rate of return and the marginal physical product will fall (Gorman, 2003).

Therefore, domestic investment is expected to play an important role in to stimulate economic growth rates in Libya, especially with the policy of openness which the country witness in this period. That might be possible if government encourage more domestic private

investment projects which should not be neglected at the expense of trend towards FDI.

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**Table 1: ADF Test for Variables and Residuals**

Variables	Level			1 <sup>st</sup> Level		
	Critical V.	Intercept	Trend	Critical V.	Intercept	Trend
<b>lnY</b>	1% -3.58	-1.79	-2.38	1% -4.17	-6.50	-6.46
<b>lnI</b>	5% -2.92	-0.995	-2.03	5% -3.51	-4.98	-4.92
<b>lnL</b>	10% -2.60	-1.97	-2.04	10% -3.18	-4.22	-4.35
<b>Residuals</b> $\varepsilon_{t-1}$		-4.17	-6.82		-8.68	-8.58

All regression estimations and test results are obtained by using Eviews 6 econometric software

**Table 2: Cointegration Test Results by Using Johansen Approach**

No. Of CE(s)	Eigenvalue	Trace 0.05		P. Value	Max-Eigen 0.05		P. Value
		Statistics	Critical		Statistics	Critical	
r=0	0.4146	33.48*	29.79	0.018	23.02*	21.13	0.026
r≤1	0.2066	10.46	15.49	0.246	9.95	14.26	0.214
r≤2	0.0117	0.50	3.84	0.467	0.50	3.84	0.476

\*denotes rejection of the hypothesis at the 0.05 level.

**Table 3: Results from Vector Error Correction Model**

Cointegration Equation			Short-run Dynamics		
Cointegration Vector	Coefficients	T. Statistics	VEC* Equation	Coefficients	T. Statistics
<b>LY<sub>t-1</sub></b>	1	-	<b>ΔLY<sub>t</sub></b>	-0.39	-3.31
<b>LI<sub>t-1</sub></b>	0.73	6.19	<b>ΔLI<sub>t</sub></b>	0.44	2.19
<b>LL<sub>t-1</sub></b>	0.40	2.41	<b>ΔLL<sub>t</sub></b>	0.17	1.14
<b>Constant</b>	57.0	-			

\*denotes Victor error correction.

**Table 4: Domestic Investment, Labour Force and Per capita GDP in Libya (Selected years)**

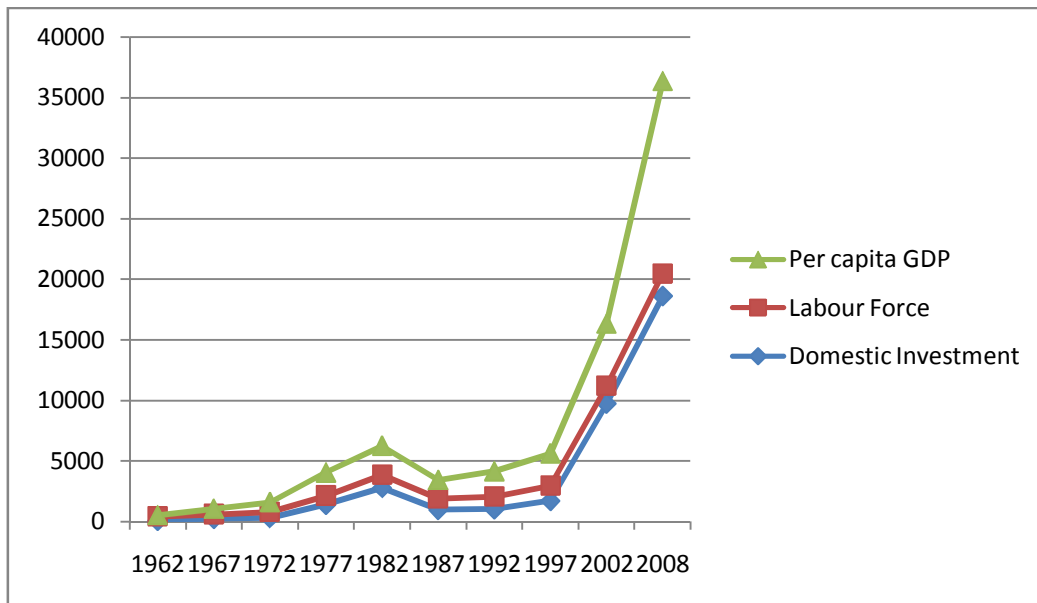
At current prices

Year	Domestic Investment (Million L.D)	Total Labour Force (Thousand)	Per capita GDP
1962	64.4	356.0	106.5
1967	210.4	389.3	429.7
1972	436.5	488.0	822.9
1977	1368.3	764.8	1909.6
1982	2771.5	1083.7	2395.8
1987	949.9	936.8	1526.9
1992	1007.8	1044.0	2095.8
1997	1684.5	1255.1	2681.0
2002	9707.6	1492.6	5151.3
2008	18592.6	1851.2	15943.0

Source: Ministry of Planning. General Administration of Socio-Economic Indicators for the years 1962-2000, December 2000, and for the year 2001-2006, December 2006.

Central Bank of Libya, Annual Bulletins 2000-2009.

**Figure 1: Trends of the Study's Variable (1962-2008)**



Source: from Table 4.

**Table 5: Private and Public Investments in the Libyan Economy  
(Selected Years)**

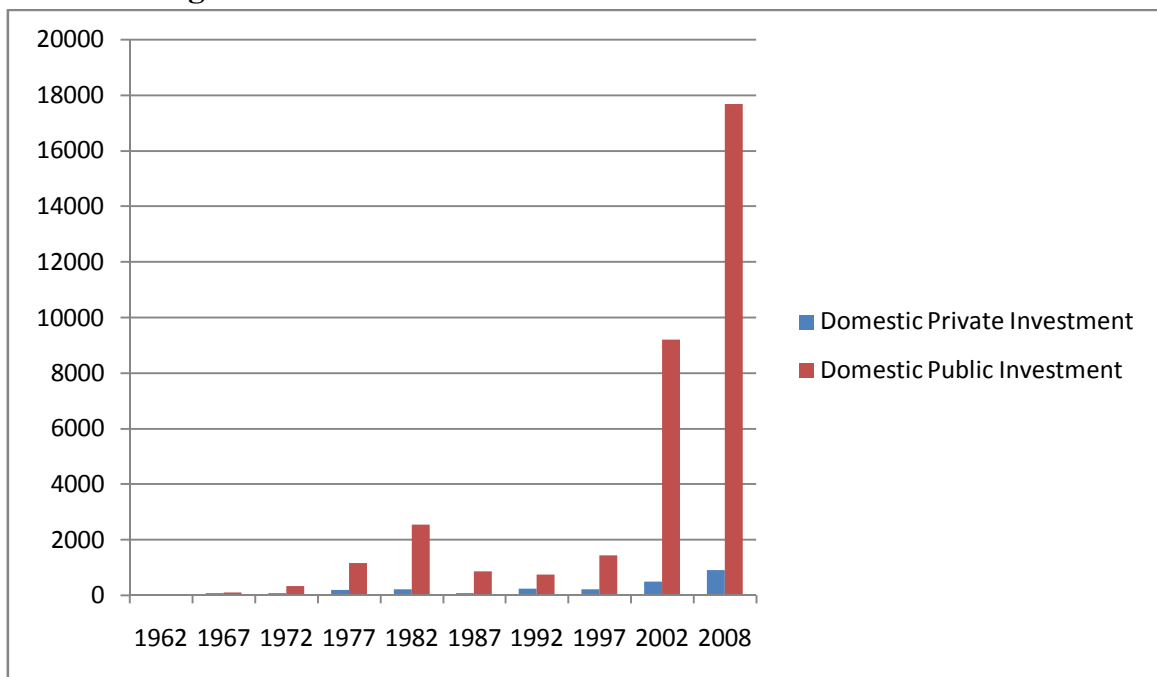
Million L.D.

Year	Domestic Private Investment	Domestic Public Investment
1962	48.5	15.9
1967	103.0	107.4
1972	98.6	337.9
1977	196.8	1171.5
1982	230.0	2541.5
1987	93.1	856.8
1992	147.9	759.9
1997	241.3	1443.3
2002	510.0	9197.6
2008	928.6	17664.0

Source: Ministry of Planning. General Administration of Socio-Economic Indicators for the years 1962-2000, December 2000, and for the year 2001-2006, December 2006.

Central Bank of Libya, Annual Bulletins 2000-2009.

**Figure 2: Domestic Private and Public Investments**



Source: from Table 5.